



Role of National Systems of Innovation in framing STI policy for SDGs

EGM on Innovation and Technology for achieving the 2030 Development Agenda

5-7 December 2017, UN-ESCWA, Beirut

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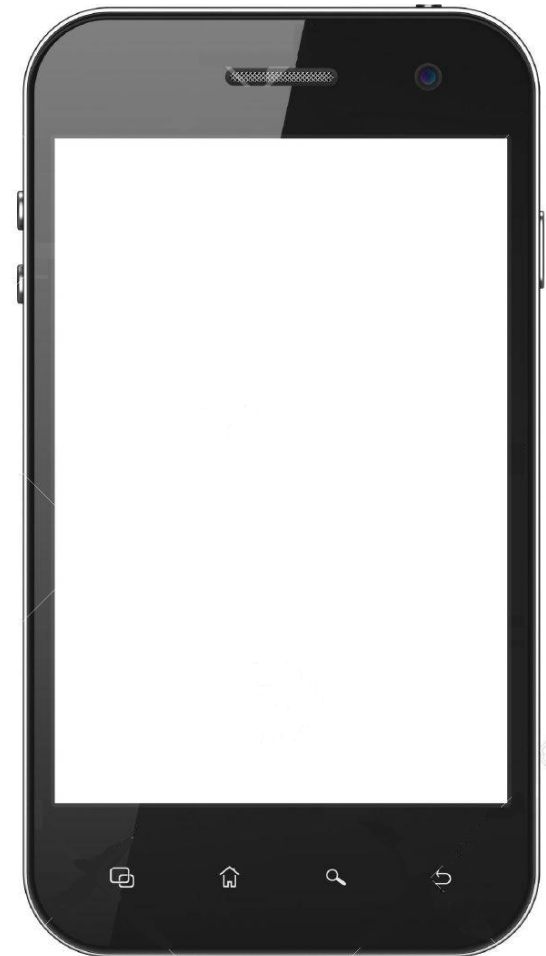


Role of National Systems of Innovation in framing STI policy for SDGs

1. What is **innovation**?
2. What is the role of **STI** policy?
3. What is a **National System of Innovation**?
4. How does **NSI** relate to SDGs and Agenda 2030?
5. Current technology developments, concerns and way forward



Apple iPhone 4



smartphone

1. What is **innovation**?

- **Knowledge and technology**
- **Product, service, or process**
- **Value: commercial or social (or environmental)**
- **How new-novel does it have to be?**
- **What is the role, why do we need STI policy?**

2. Q: What is the role of **STI** policy?

A: Remedy market failure, failure of institutions

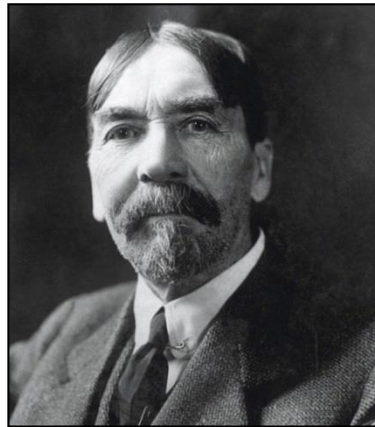
- Externalities
- Uncertainty
- Indivisibility
- More uncertainty
 - Market uncertainty (preferences, fads, demographics...)
 - Business uncertainty (competitors, suppliers, value chains...)
 - Technology uncertainty (will it technically scale in production?)
 - Policy uncertainty (change in regulations, policies...)
- ... but also **Development Aspirations**: catch-up, livelihood, welfare, poverty

3. What is a National System of Innovation?

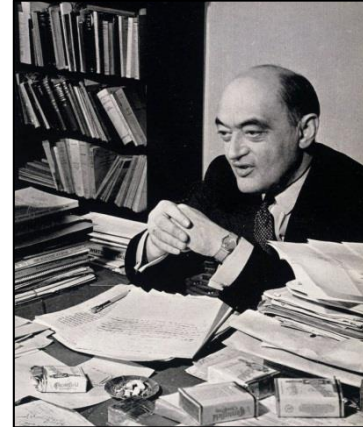
Not a new concept



Friedrich List
1789-1846



Thorstein Veblen
1857-1929



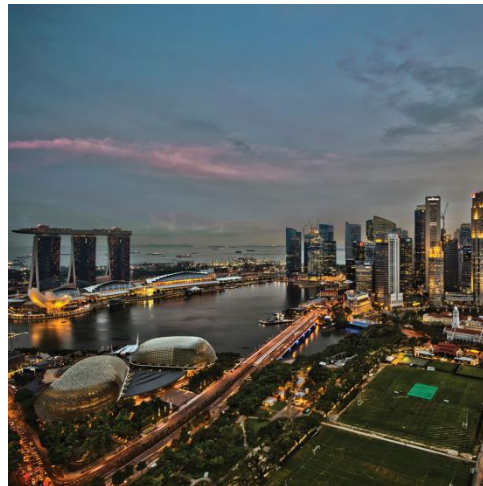
Joseph Schumpeter
1883-1950



Christopher Freeman
1921-2010



Marshall Plan post-WWII



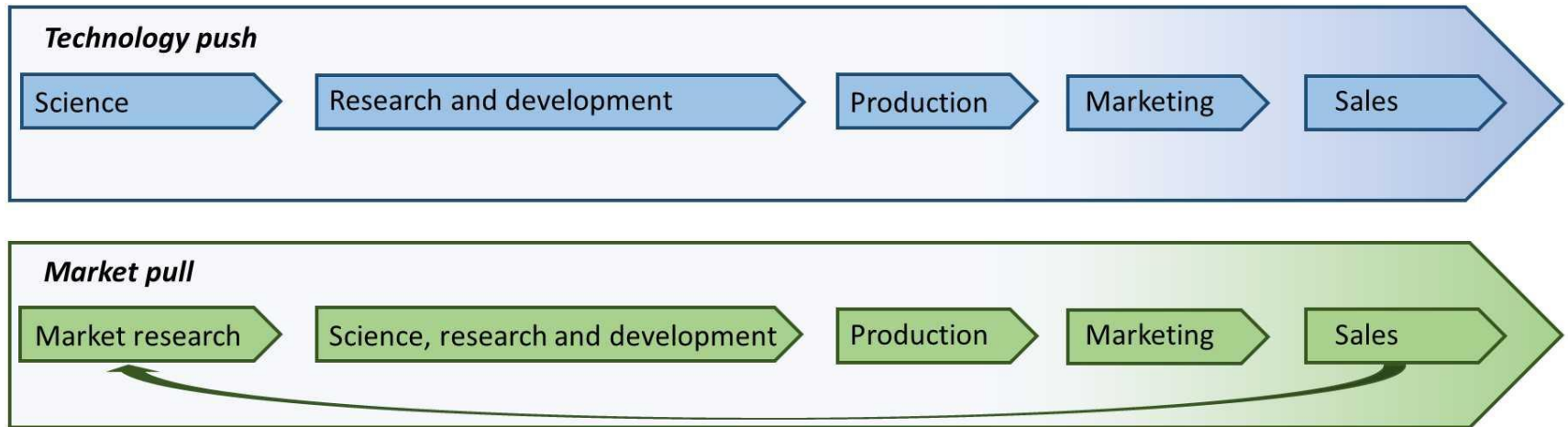
Asian catch-up

2017 EUROPEAN INNOVATION SCOREBOARD
EU MEMBER STATES' INNOVATION PERFORMANCE

- Innovation Leaders
- Strong Innovators
- Moderate Innovators
- Modest Innovators



A. Common wisdom: Linear Innovation Model



B. National System of Innovation

- Firm-centric
- Interaction in the socio-economic environment
- Institutions
- Relationships
- **Not an STI policy**

Q: Does the NSI work?

Linkages
Interactions
Relationships

Quantity
Quality

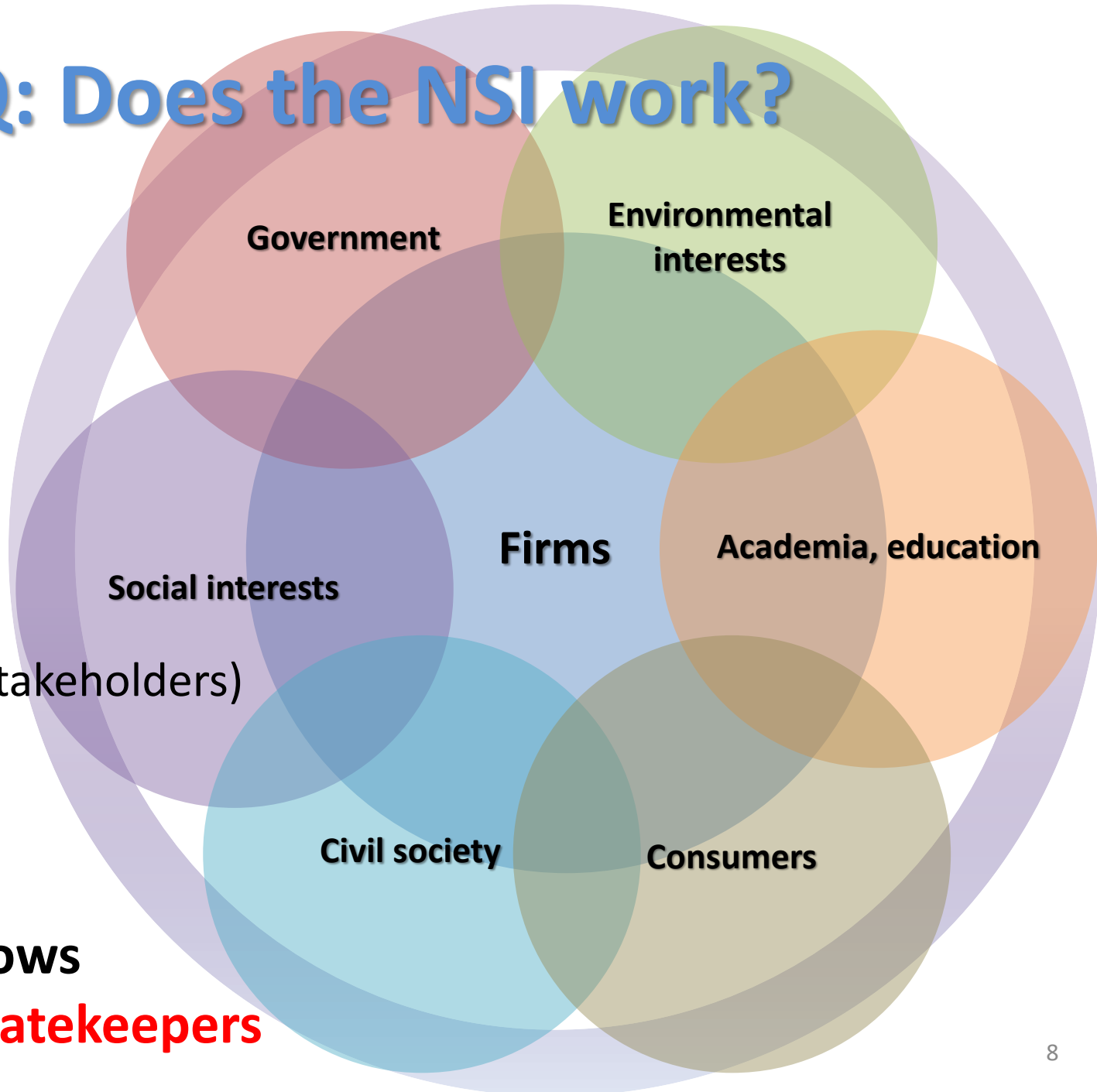
Institutions (stakeholders)

Capability
Capacity

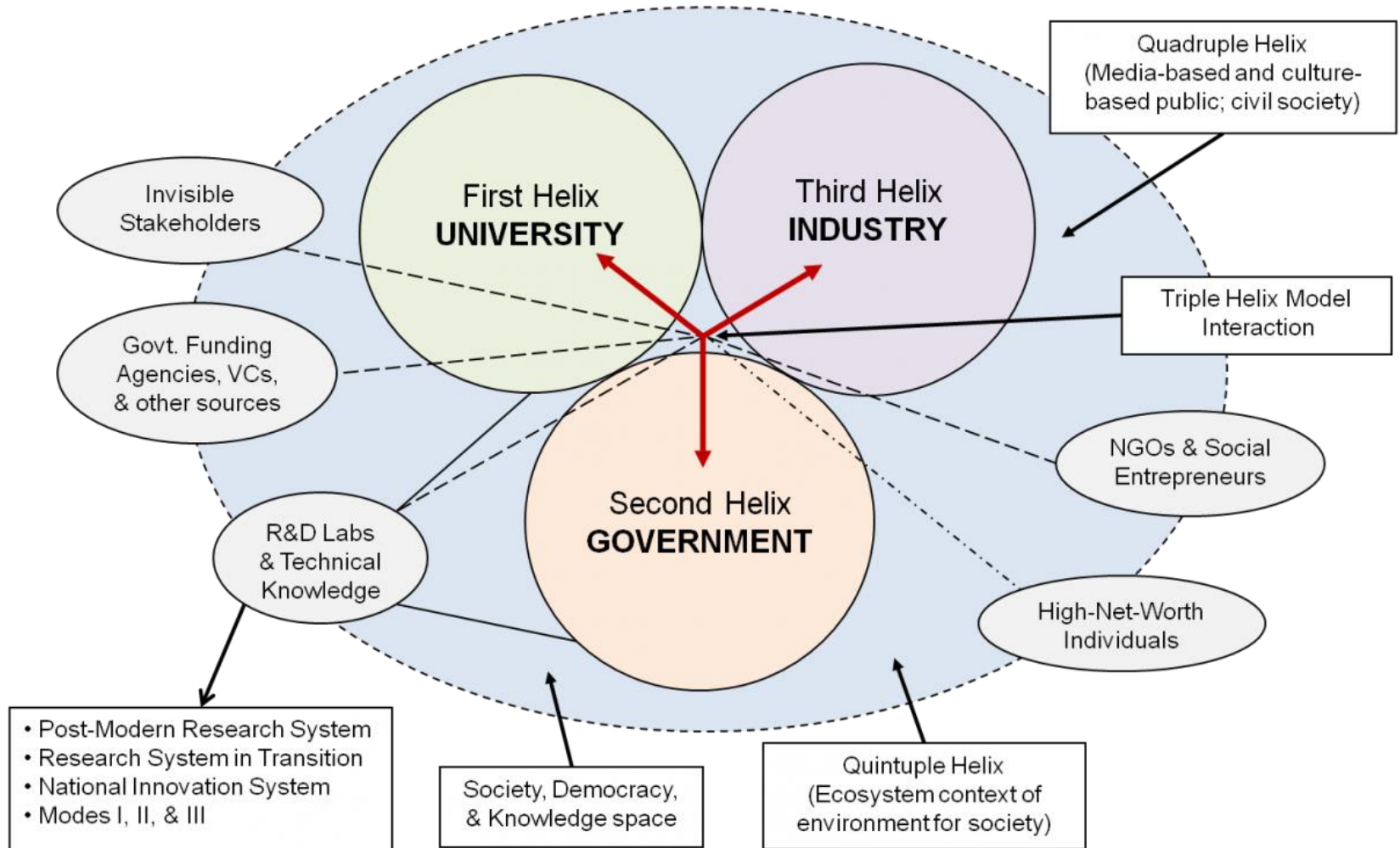
Learning

Knowledge flows

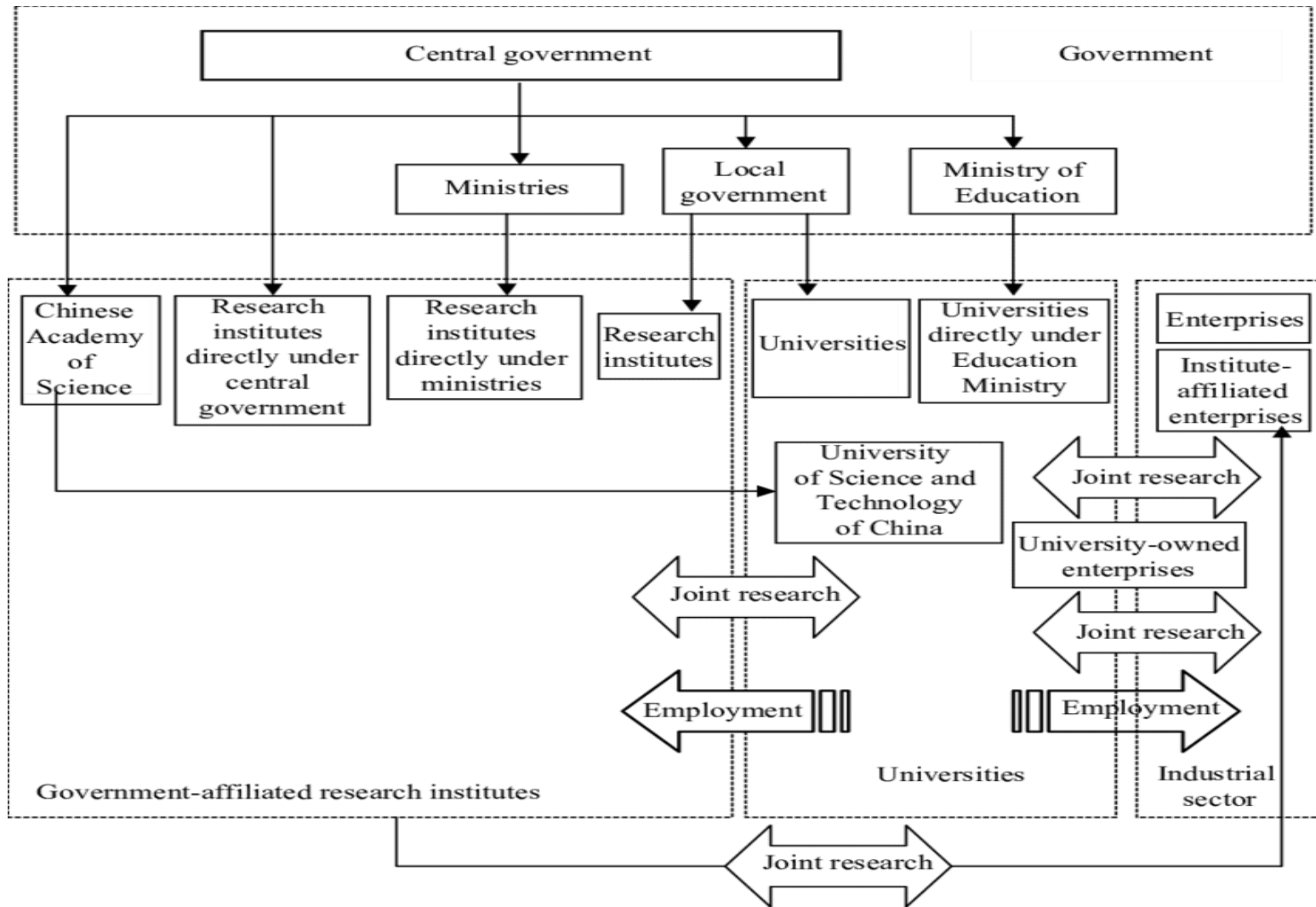
Information gatekeepers



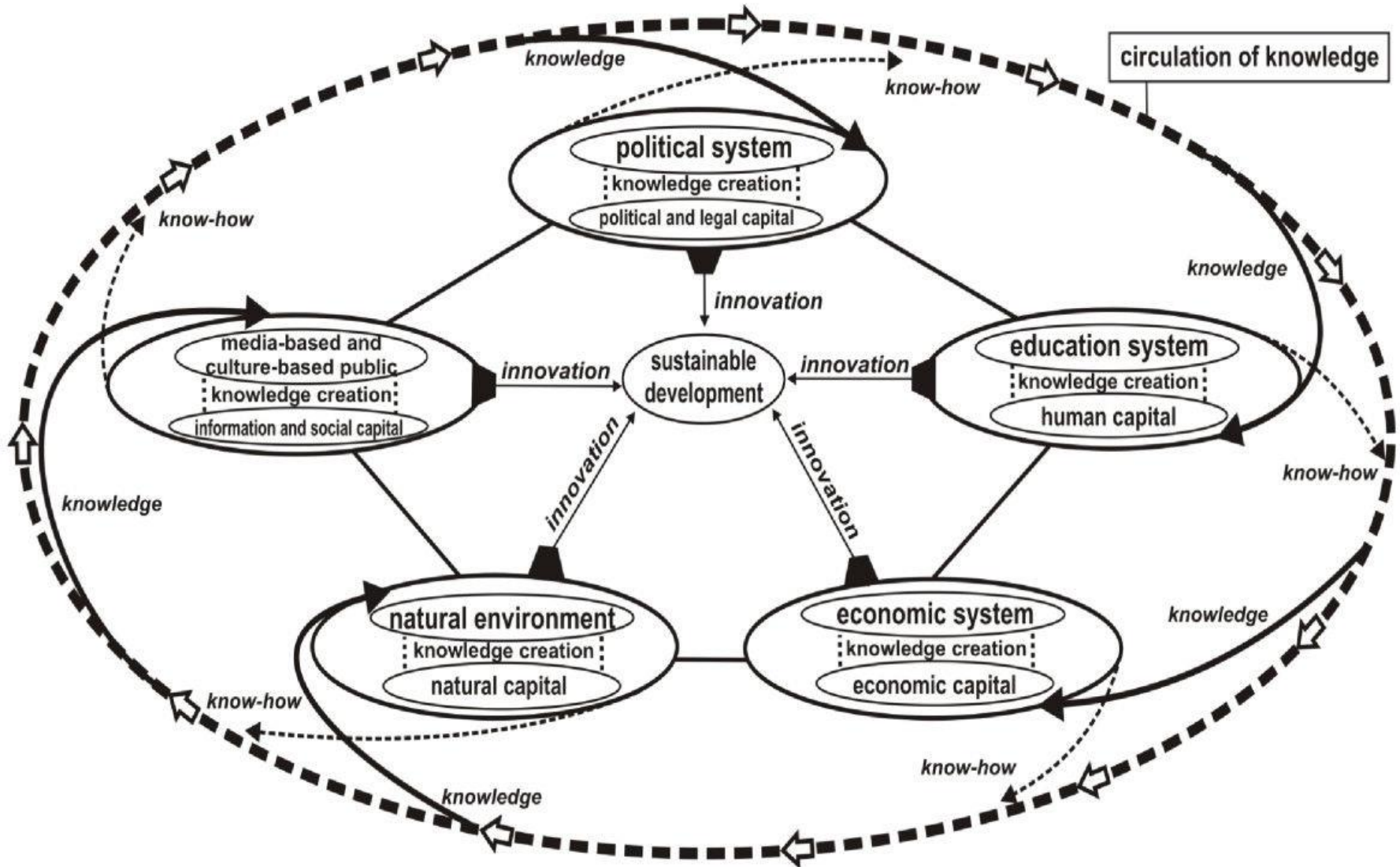
Knowledge Systems of Innovation and Major Stakeholders in India



Innovation entities in China's national innovation system



Quintuple Helix innovation model



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Denmark – a nation of solutions

Enhanced cooperation and improved frameworks for innovation in enterprises

December 2012 The Danish Government

Australian Business Foundation

NATIONAL INNOVATION SYSTEMS: FINLAND, SWEDEN & AUSTRALIA COMPARED

LEARNINGS FOR AUSTRALIA

NOVEMBER 2005

REPORT PREPARED FOR
THE AUSTRALIAN BUSINESS FOUNDATION BY

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Available online at www.sciencedirect.com
SciVerse ScienceDirect
Procedia - Social and Behavioral Sciences 75 (2013) 119 – 128

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Procedia
Social and Behavioral Sciences

2nd International Conference on Leadership, Technology and Innovation Management
National Innovation Systems: the Moroccan Case

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Abstract
Morocco has introduced in the last 90s a National Innovation System (NIS) to make innovation a driving force for economic development in a particularly competitive context. However, the anticipated dynamics of this system do not live up to expectations. In this context, this paper proposes an analysis of the architecture of the Moroccan NIS, an assessment in the field of innovation, and its limits. The overall goal of the article is to understand why technical high-performance remains of limited impact over Moroccan economy.

Keywords: NIS, National Innovation System, R&D, Morocco

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Selection and peer review under responsibility of The Second International Conference on Leadership, Technology and Innovation Management

1. Introduction
Innovation is one of the foundations for building competitive advantages specific to each economic context. Nonetheless, innovation is not an isolated series of phases, but rather a set of ongoing interactions between the possibilities that the technology or the market can offer, the means employed by the company or the State as well as actors' strategies (Dreyer and Dalsgaard, 1990). It is therefore a process heavily influenced by public policy (Etzkowitz, 2010).

The first integrated approach to National Innovation Systems (NIS) was proposed by Lundvall (1985 and 1988). This approach is based on the concept of 'national system of production' suggested by Lutz and Von Hippel's work on the informal technical collaborations among companies. Lundvall proposes three interacting spheres for the national system of innovation: first, a productive sphere related to its economic and industrial structure. Second, a training-based sphere related to human resources training. And finally, a research sphere, characterized mainly by bonds both between public research institutions and companies (Dyfflat, 2002).

Several authors have emphasized the interest of developing national innovation systems (NIS) in developing countries, stressing that this is a new area of research (Dyfflat 2003, 2004, 2008, Casadilla and Benabdeljalil-Tiemstra 2006, Beldar and Hamouch 2004, ...). Their work shows in particular that proficiency in knowledge utilization is accompanied by a reduction of poverty and an improvement of income distribution. The research of Dyfflat (2009) even describes a system to implement for a "take off" of research and development and innovation in African countries.

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Selection and peer review under responsibility of The Second International Conference on Leadership, Technology and Innovation Management.
doi:10.1016/j.procs.2013.04.014

Available online at www.sciencedirect.com
ScienceDirect
Procedia - Social and Behavioral Sciences 166 (2015) 480 – 487

ELSEVIER

Procedia
Social and Behavioral Sciences

International Conference on Research Paradigms Transformation in Social Sciences 2014

Features of the Advancement of Science as an Integral Part of the National Innovation System in Modern Russia

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Abstract
The study explores current tendencies in science and innovation in Russia and gives an assessment of perspectives for optimization of the national innovation system. The paper reviews the main trends in the development of science and innovation in the modern world. A comparative analysis of the historical experience in science and innovation in Russia is made that reveals the dominating role of the state and forms, indicate further development of the national innovation system. The evolution of the current national innovation system shows the acceleration of the Russian state to preserve the traditional system. Extrapolation of the results of the current policy, even to the same forms, indicate further degradation of the national innovation system is likely. The findings of the study demonstrate the need to work out a strategy for development of the national innovation system in which the government will have to merge other parts of the innovation system, such as private companies, universities, and universities, and create an open and competitive environment with free access to resources for every participant to achieve the full potential of the national innovation system.

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Peer review under responsibility of Tomsk Polytechnic University.

Keywords: innovation, national innovation system, science

1. Introduction
The paper deals with the Russian government policy in the field of science and innovation development. The study focuses on the analysis of traditional principles of science and technology policy in Russia as well as their transformation in post-Soviet Russia. The analysis also aims to reveal the main contradictions and problems related to the implementation of the government's policy toward innovation development to find the historical and cultural roots of their formation.

Current science of science treats the process of scientific knowledge and innovation as a complex system with a number of interacting factors which give rise to new ideas and knowledge. This knowledge in turn may contribute to the development of new products, processes, organizations, and the opening of new markets (Schumpeter, 1939; Schumpeter, 1967). Today many researchers, when analyzing the process of obtaining new knowledge (primarily,

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Peer review under responsibility of Tomsk Polytechnic University.
doi:10.1016/j.procs.2014.12.559

MINISTRY OF EDUCATION

Evaluation of the Finnish National Innovation System

Policy Report

www.evaluation.fi

TUO-JR ELINKEINOministeriö
SUOMEN KASVU- JA TYÖVOIMAMINISTERIÖ
MINISTRY OF EMPLOYMENT AND THE ECONOMY

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT
UNCTAD

Science, Technology & Innovation Policy Review

Oman

UNITED NATIONS



Science, Technology and Innovation Policy Reviews (STIP Reviews)

The Science, Technology and Innovation Policy Reviews prepared by UNCTAD aim to contribute to the development of national capacities in the field in order that national science, technology and innovation plans and programmes better contribute to development strategies and to improve the competitiveness of the productive sectors.

Science, Technology and Innovation Policy Reviews completed to date



PUBLICATIONS

- Flagship Reports
- Series
- Policy Briefs
- Reports of Intergovernmental Meetings

These reviews are intended to serve as an analytical instrument which examines a set of proposals from an external and neutral perspective, and to make some suggestions for action. They are not a rating mechanism.

Documents

[Science, Technology and Innovation Policy Review: Rwanda \(UNCTAD/DTL/STICT/2017/8\)](#)

24 Oct 2017, 4574.8 KB

[Science, Technology and Innovation Policy Review: Iran \[Persian Translation\] \(UNCTAD/DTL/STICT/2016/3 \(Persian\)\)](#)

21 Feb 2017, 5589.0 KB

[Science, Technology and Innovation Policy Review: Iran \(UNCTAD/DTL/STICT/2016/3\)](#)

27 Dec 2016, 3442.0 KB

[Science, Technology and Innovation Policy Review: Thailand \(UNCTAD/DTL/STICT/2015/1\)](#)

07 May 2015, 5537.4 KB

[Science, Technology and Innovation Policy Review: Oman \(UNCTAD/DTL/STICT/2014/1\)](#)

03 Nov 2014, 1143.9 KB

عربي |

[Science, Technology and Innovation Policy Review - Dominican Republic \(UNCTAD/DTL/STICT/2012/1\)](#)

21 Jun 2012, 116 page(s), 4887.9 KB

<https://tinyurl.com/unctadstipreview>

Q: what problem does a National System of Innovation solve?

A1: Moves STI policy past funding R&D

A2: Goes beyond market failure problems

A3: Provides a framework for developing and implementing policy

A4: Includes firms, markets, institutions and interests... and Agenda 2030 stakeholders

NB: All above critical for SDGs action

4. How does **NSI** relate to SDGs?



- Require knowledge, technology and innovation
- Require interaction and partnerships, **SDG 17 > NSI**
- Require sustainable action by firms-entrepreneurs

SDG 17 is analogous to a NSI framework at a global level

17 PARTNERSHIPS
FOR THE GOALS



"Strengthen the means [framework] of implementation and revitalize the global partnership for sustainable development"

SDG 17 has specific technology targets:

17.6 on international collaboration

17.7 on promoting environmentally sound technologies

17.8 on innovation capacity-building (focus on LDCs)

SDG 17: Underscores the complexity of the task at hand in terms of linkages and relationships => NSI

NSI > STI > SDGs: Aiming at quick and profound transformation driven by fast-evolving and converging technologies

1. **No definitive list of technologies**
2. **Common features of new technologies relevant to Agenda 2030**
 - Fast change and short adaptation cycles
 - Lower costs and wider choices
 - More open science, technology and innovation
 - New forms of work and inclusiveness
 - **DISRUPTIVE INNOVATION** (Christensen, HBR Jan/Feb '95)

5. Current technology developments

- **Precision agriculture:** SDGs 1, 2, 9, 12, 15
- **Water management, wastewater treatment and nutrient recovery:** SDGs 6, 9, 11, 15
- **Circular economy:** SDGs 6, 7, 13, 14, 15
> residual, waste = resource for products, energy
- **Transformative technologies:** SDGs 3, 4, 8, 9, 10
> exponential growth, impact, strong links with ICTs
(e.g.: AI, IoT, robotics, autonomous V, blockchain, 3D printing-additive mfg.)

Current concerns, way forward

- **Big issue is SDG 5: Gender Equality**
- **Q: Are SDG actions sustainable?**
A: Innovation and entrepreneurship
- **Q: What to do?**
A: Get policy fundamentals right
 - > **strengthen NSI** – framework for STI (do an STI Policy Review?)
 - > support **innovative firms** (accelerators, finance, fiscal, HR...)
 - > strengthening **education and training**
 - > build domestic and international **linkages**
 - > **demand-side** science, technology and innovation policy
 - > **inclusive, grassroots, social, open > SDGs-relevant**

**Trade and Development Board**

Investment, Enterprise and Development Commission

Ninth session

Geneva, 20–24 November 2017

Item 4 (b) of the provisional agenda

**From decisions to actions: Investment and enterprise
development as catalysts for accomplishing the 2030 Agenda
for Sustainable Development – Enterprise and information and
communications technology****Science, technology and innovation as catalysts for
the Sustainable Development Goals**

Note by the UNCTAD secretariat

Executive summary

Science, technology and innovation are critical to the achievement of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals. Given a strong effort to upgrade the related capabilities of developing countries, science, technology and innovation can drive productivity improvement and economic growth, promote social inclusion and enable environmental sustainability. This note addresses the potential of several emerging technologies to contribute to the Goals and links them to examples of innovation in developing countries. The note also includes considerations of possible policy frameworks that leverage science, technology and innovation for inclusive and sustainable development, and suggests points for further discussion by the Investment, Enterprise and Development Commission.

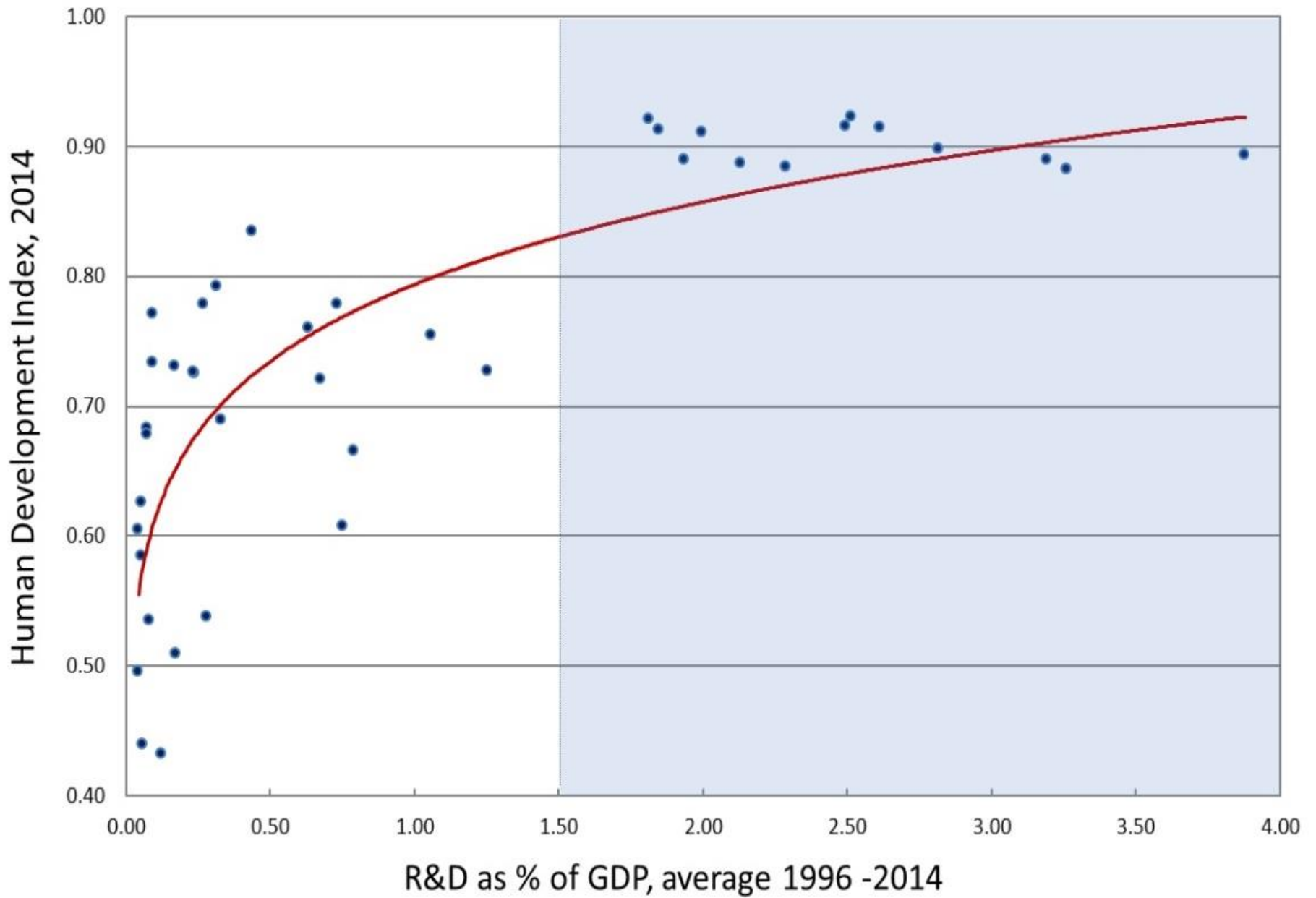
UNCTAD TD/B/C.II/36

Thank you!

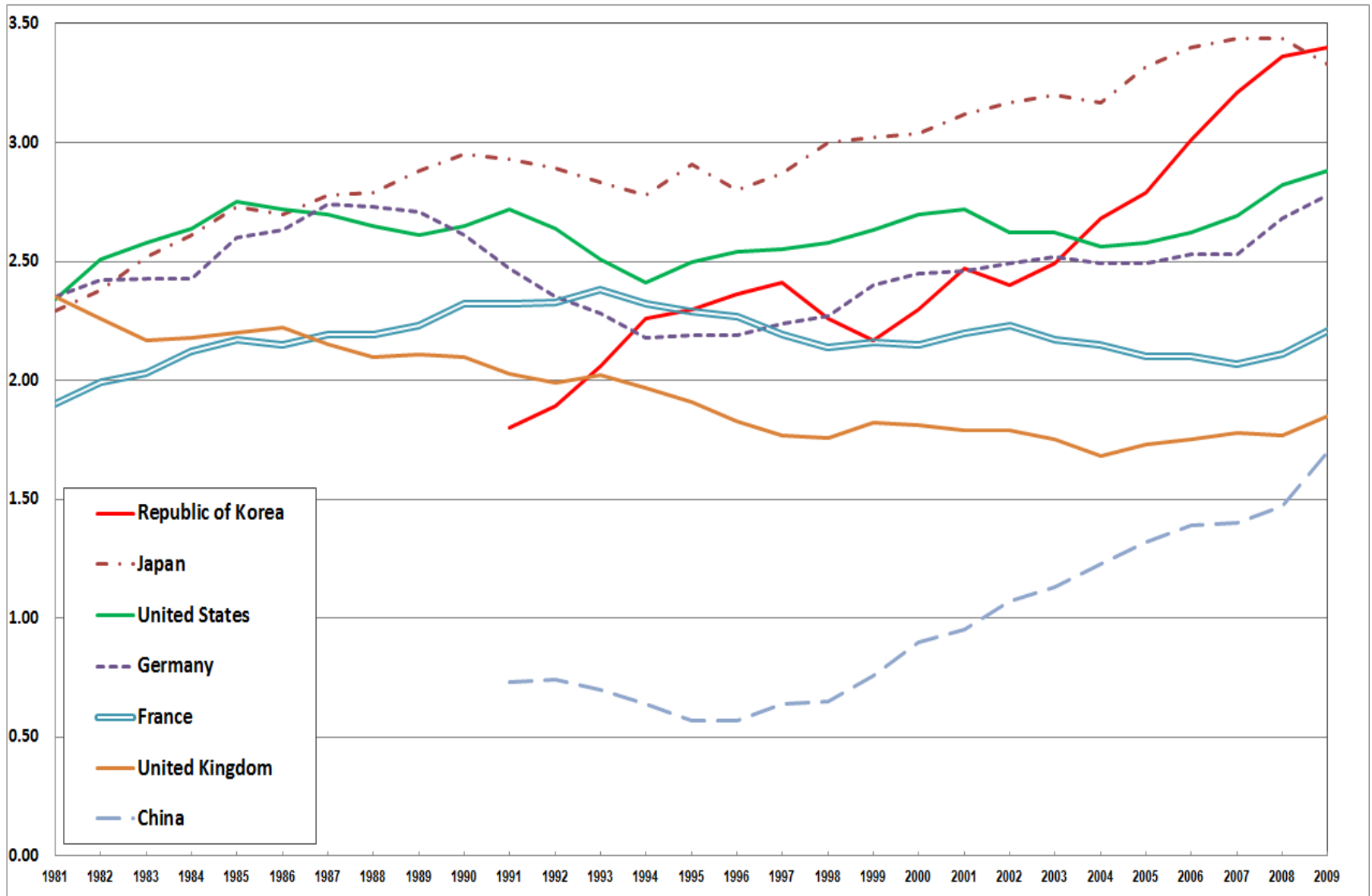
Dimo Calovski

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STI and economic development



Gross R&D as a per cent of GDP, 1981-2009



Labour productivity growth

